Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. Previously cancelled.

2. (Previously amended): A digital telemetry system having improved data rate and robustness, comprising:

a data transmission cable having a first end and a second end, and capable of transmitting data on at least two propagation modes;

a data source connected at the first end and having data transmission circuitry to generate data signals on the at least two propagation modes;

a receiver connected to the second end whereon the receiver receives signals on a first and second of at least two propagation modes and having

a processor connected to a storage medium storing instructions directing the processor to execute

an adaptive far-end cross-talk cancellation logic for canceling cross-talk that occurs between the first and second propagation modes, wherein the adaptive far-end cross-talk cancellation logic comprises

a first propagation mode cross-talk adjustment logic to direct the processor to receive samples on a first propagation mode and having logic to direct the processor to accept samples from a second propagation mode wherein the first propagation mode cross-talk adjustment logic directs the processor to adjust the samples on the first propagation mode by values that are a function of the samples of the second propagation mode; and further comprises instructions to cause the processor to

determine a slice residual from the output of the cross-talk adjustment logic; and

update a cross-talk parameter from the slice residual.

3. Previously Cancelled.

4. (Previously Amended): The digital telemetry system of Claim 2, wherein the far-end adaptive cross-talk cancellation logic causes the processor to accept as input one value on each of a plurality of carriers and to compute the cross-talk component for each carrier.

5. (Previously Amended): The digital telemetry system of Claim 4, wherein the far-end adaptive cross-talk cancellation logic directs the processor to compute the cross-talk component for each carrier by multiplying the signal received on the second propagation mode by a carrier specific coefficient.

6. (Previously Amended): The digital telemetry system of Claim 5, wherein a far-end cross-talk parameter update logic directs the processor to update each carrier specific coefficient as a function of the slice residual on such carrier.

7. (Currently Amended): A digital telemetry system having improved data rate and robustness, comprising:

a data transmission cable having a first end and a second end, and capable of transmitting data on at least two propagation modes;

a data source connected at the first end and having data transmission circuitry to generate data signals on the at least two propagation modes;

a receiver connected to the second end whereon the receiver receives signals on a first and second of at least two propagation modes and having

a processor connected to a storage medium storing instructions directing the processor to execute

an adaptive far-end cross-talk cancellation logic for canceling cross-talk that occurs between the first and second propagation modes,

wherein the adaptive far-end cross-talk cancellation logic comprises a first propagation mode cross-talk adjustment logic to direct the processor to receive samples on a first propagation mode and having logic to direct the processor to accept samples from a second propagation mode wherein the first propagation mode cross-talk adjustment logic directs the processor to adjust the samples on the first propagation mode by values that are a function of the samples of the second propagation mode, and

further wherein the far-end adaptive cross-talk cancellation logic causes the processor to accept as input one value on each of a plurality of carriers and to compute the cross-talk component for each carrier by multiplying the signal received on the second propagation mode by a carrier specific coefficient and to update each carrier specific coefficient by applying the equation:

$$CXYi = CXYi + \\ AlphaFEXT * (< CEXi, CEXi > / REF\_MAGN^2) * < TXFFT\_out[i], TYresidual[i] >$$

where

CEXi is the frequency domain equalizer coefficient for the ith carrier of propagation mode X;

CXYi is the cross-talk cancellation coefficient for the ith carrier for cancelling far-end cross-talk from propagation mode X to propagation mode Y;

AlphaFEXT is a constant for balancing the tracking speed of CXYi against the stability of the value of CXYi;

REF_MAGN is the Root Means Square (RMS) magnitude of CEXi ~~the reference data points~~;

TXFFT_out[i] is the frequency domain data point on the ith carrier on propagation mode X;

TYresidual[i] is the slice residual for the ith data point on the Y propagation mode; and

< > is ~~the~~ a complex scalar product defined as <a+*j*b, c+*j*d>=(a-*j*b)*(c+*j*d)=(ac+bd)+*j*(ad-bc).

8. (Previously Amended): The digital telemetry system of Claim 2, wherein the far-end cross-talk adjustment logic directs the processor to receive *m* samples from the second propagation mode and convolve these using *m* coefficients.

9. (Currently Amended): The digital telemetry system of Claim 8, wherein the storage medium further stores instructions comprising ~~a~~ the slice determination logic and a coefficient update logic directing the processor to adjust the *m* coefficients as a function of a slice residual determined by the slice determination logic.

10. (Currently amended): A digital telemetry system having improved data rate and robustness, comprising:

a data transmission cable having a first end and a second end, and capable of transmitting data on at least two propagation modes;

a data source connected at the first end and having data transmission circuitry to generate data signals on the at least two propagation modes;

a receiver connected to the second end whereon the receiver receives signals on a first and second of at least two propagation modes and having

a processor connected to a storage medium storing instructions directing the processor to execute

an adaptive far-end cross-talk cancellation logic for canceling cross-talk that occurs between the first and second propagation modes, the adaptive far-end cross-talk cancellation logic comprising a first propagation mode cross-talk adjustment logic to direct the processor to receive samples on a first propagation mode and having logic to direct the processor to accept samples from a second propagation mode wherein the first propagation mode cross-talk adjustment logic directs the processor to adjust the samples on the first propagation mode by values that are a function of the samples of the second propagation mode,

wherein the far-end cross-talk adjustment logic directs the processor to receive *m* samples from the second propagation mode and convolve these using *m* coefficients and the storage medium further stores instructions comprising a slice determination logic and a coefficient update logic directing the processor to adjust the *m* coefficients as a function of a slice residual determined by the slice determination logic using the equation:

$$CXYi = CXYi + AlphaFEXT * (< CEXi, CEXi > / REF\_MAGN^2) * < TY_{(n-i)}, TXresidual >$$ where,

CEXi is the *ith* time domain equalizer coefficient of propagation mode X;

CXYi is the *ith* cross-talk cancellation coefficient for canceling far-end cross-talk from propagation mode X onto propagation mode Y;

$TY_{(n-i)}$~~j~~ is the ~~*jth*~~ *(n-i)th* sample from the second ~~receive circuitry coefficient of~~ propagation mode Y;

~~TXResidual~~ TXresidual is TXCorr - TXIdealPoint

where TXCorr is the cross-talk corrected output from the cross-talk adjustment ~~circuit~~ logic and TXIdealPoint is an ideal constellation point for propagation mode X; and

AlphaFEXT is a constant between 0 and 1~~1 and 0~~;

REF_MAGN is the Root Means Square (RMS) magnitude of CEXi;

and

< > is ~~the~~ a complex scalar product defined as <a+*j*b, c+*j*d>=(a-*j*b)*(c+*j*d)=(ac+bd)+*j*(ad-bc).

11. (Currently amended): The digital telemetry system of Claim 10, wherein AlphaFEXT is in the range 0.00001 to 0.001 ~~to 0.00001~~.

12. Previously Cancelled.

13. Previously Cancelled.

14. Previously Cancelled.

15. (Currently amended) A method of digital telemetry having improved data rate and robustness by canceling far-end cross-talk from a near-lying propagation mode, comprising:

inputting a first sample received on a first propagation mode;

inputting a second sample received on a second propagation mode;

determining ~~the~~ a slice residual;

determining a cross-talk component from the second sample on the first sample ;

adjusting a function used to determine the cross-talk component as a function of the slice residual; and

determining an output by subtracting the cross-talk component from the second sample from the first sample, wherein the cross-talk component is determined by multiplying a carrier specific coefficient with a sample received on a corresponding carrier on the near-lying propagation mode and the coefficient~~s are~~ is updated by applying the function:

$$CXYi = CXYi +$$
$$AlphaFEXT * (< CEXi, CEXi > / REF\_MAGN^2) * < TXFFT\_out[i], TYresidual[i] >$$

where

CEXi is the frequency domain equalizer carrier for ith carrier of propagation mode X;

CXYi is the cross-talk cancellation coefficient for the ith carrier for canceling far-end cross-talk from propagation mode X to propagation mode Y;

AlphaFEXT is a constant for balancing the tracking speed of CXYi against the stability of the value of CXYi;

REF_MAGN is the RMS magnitude of magnitude of CEXi ~~the reference data points~~;

TXFFT_out[i] is the frequency domain data point on the ith carrier of propagation mode X;

TYresidual[i] is the slice residual for the ith data point on the Y propagation mode; and

< > is ~~the~~ a complex scalar product defined as <a+*j*b, c+*j*d>=(a-*j*b)*(c+*j*d)=(ac+bd)+*j*(ad-bc).

16. Previously Cancelled.

17. Previously Cancelled.

18. Previously Cancelled.

19. (Currently amended) A method of digital telemetry having improved data rate or robustness by canceling far-end cross-talk from a near-lying propagation mode, comprising:

inputting a first set of samples received on a first propagation mode;

inputting a second set of samples received on a second propagation mode;

determining a cross-talk component by convolving the second set of samples, convolving comprising multiplying each sample in the second set of samples by a coefficient;

determining an output by subtracting the cross-talk component from a first sample on the first propagation mode;

determining a slice residual between the output and an ideal point; and

adjusting the coefficients as a function of the slice residual by applying the equation:

$$CXYi = CXYi + AlphaFEXT * (< CEXi, CEXi > / REF\_MAGN^2) * < TY_{(n-i)}, TXresidual >$$ where,

CEXi is the ith time domain equalizer coefficient for propagation mode X;

$TY_{(n-i)}$~~j~~ is the *(n-i)*~~jth~~ sample from the second ~~receive circuitry of~~ propagation mode Y;

~~TXResidual~~ TXresidual is TXCorr - TXIdealPoint

where TXCorr is the cross-talk corrected output from the cross-talk adjustment circuit and TXIdealPoint is an ideal constellation point for propagation mode X; ~~and~~

AlphaFEXT is a constant between 0 and 1 ~~and 0~~; and

< > is ~~the~~ a complex scalar product defined as <a+*j*b, c+*j*d>=(a-*j*b)*(c+*j*d)=(ac+bd)+*j*(ad-bc).

20. (Currently amended): The method of Claim 19 wherein AlphFEXT is in the range 0.00001 to 0.001 ~~to 0.00001~~.